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09/937,858	09/28/2001	Yuji Matsuda	Y-189	7097

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EXAMINER

MOUTTET, BLAISE L

ART UNIT

PAPER NUMBER

2853

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/937,858	MATSUDA, YUJI
Examiner	Art Unit	
Blaise L Mouttet	2853	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) Responsive to communication(s) filed on 30 January 2003.

2a) This action is **FINAL**. 2b) This action is non-final.

3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) Claim(s) 1-17 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) Claim(s) 9 and 17 is/are allowed.

6) Claim(s) 1-5,7,8 and 10-15 is/are rejected.

7) Claim(s) 6 and 16 is/are objected to.

8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) The specification is objected to by the Examiner.

10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11) The proposed drawing correction filed on _____ is: a) approved b) disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12) The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) All b) Some * c) None of:

1. Certified copies of the priority documents have been received.
2. Certified copies of the priority documents have been received in Application No. _____.
3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) The translation of the foreign language provisional application has been received.

15) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) Notice of References Cited (PTO-892) 4) Interview Summary (PTO-413) Paper No(s). _____

2) Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) Notice of Informal Patent Application (PTO-152)

3) Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) Other: _____

DETAILED ACTION

Claim Objections

1. Claims 11 and 12 are objected to because of the following informalities:

In the amendment to claim 11 submitted January 30, 2003 the applicant has included the limitation that the detection combines the low resolution position detection and high resolution position detection. However while the examiner understands the meaning of the claim in light of applicant's specification the wording of the claim is less than clear. For example in reference to "the detected position" in claim 11, line 18 it is less than clear whether the detected position is referring to the detected high resolution position, the detected low resolution position or a combination of the two. In light of applicant's intended meaning in view of the specification the examiner suggests amending claim 11, lines 13-19 to read as follow to more clearly put forward the invention of claim 11:

--detecting a low-resolution position based on said linear scale when the print element is detected and detecting a high-resolution position within the unit interval with said timer [, by combining said low-resolution position with said high-resolution position]
;and

obtaining the deviation between [the detected position] a position detected by
combining said low resolution position detection with said high-resolution position
detection and said print target position. --

Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in–
(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or
(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2)(a) of such treaty in the English language.

Applicant cannot rely upon the foreign priority papers to overcome this rejection because a translation of said papers has not been made of record in accordance with 37 CFR 1.55. See MPEP § 201.15.

2. Claims 1-5, 11 and 13-15 are rejected under 35 U.S.C. 102(e) as being anticipated by Ikeda US 6,390,588.

Ikeda discloses, regarding claim 1, an image forming device (figure 1) that forms an image on a print paper (105) in an ink jet recording method with a plurality of heads (120-123), comprising:

main scanning direction moving means (103) for moving a carriage (102) in a main scanning direction (A), said carriage (102) having said plurality of heads (120-123) mounted thereon (column 2, lines 51-52);

paper conveying means (107) for conveying the print paper (105) in a sub-scanning direction (C);

pattern printing means for printing, with at least one head, a test pattern including predetermined pattern elements (column 2, lines 59-61);

pattern detecting means (11), mounted on said carriage (102), for detecting the pattern elements of the test pattern printed on the print paper by said printing means (column 2, lines 62-65, column 4, lines 64-65);

binary conversion means for binarizing an output of said pattern detecting means (11) (column 5, lines 2-14);

position detecting means (20) for detecting a position of the carriage (102) in said main scan direction (column 2, lines 54-58); and

calculating means for moving said carriage (102) to detect the pattern elements of the test pattern with said pattern detecting means (11), for detecting a print position of the pattern elements based on a detection result of said position detection means when a rising and/or falling edge of a binary signal obtained by said binary conversion means is generated, and for calculating a mounting deviation amount of each head in said main scanning direction (column 2, line 66 - column 3, line 9),

wherein said position detecting means (20) comprises low-resolution position detecting means based on a linear scale provided on a movement path of said carriage (102) (column 5, lines 15-25) and high resolution position detecting means (timer) for detecting a position more finely than a minimum unit determined by a resolution of said low resolution position detecting means (column 8, lines 7-14) such that said low resolution position detecting means and said high resolution position detecting means

are combined with each other to precisely detect the positions of the pattern elements (column 2, line 66 - column 3, line 9).

Regarding claim 2, a vertical bar test pattern extending in the sub-scan direction is included in the test pattern for each head as disclosed in relation to figure 15B.

Regarding claim 3, the image forming device includes horizontal bar test pattern extending in the main scan direction (figure 15A), conveyance amount detecting means (410) for detecting a conveyance amount of the print paper in the sub-scanning direction (column 11, lines 6-22) and measuring means (11) for measuring the conveyance amount equal to or smaller than a minimum unit determined by a resolution of said conveyance amount detecting means (410) (column 11, lines 57-67), wherein said calculating means calculates the mounting deviation of the print heads in the sub-scan direction using the detected horizontal bar and sub-scan encoder signal (column 14, lines 9-13).

Regarding claims 4, 13 and 14, the pattern detecting means (11) has a light emitter and detector (column 5, lines 2-7).

Regarding claims 5 and 15, a counter (405) counts the encoder timing signal from the linear scale to establish the low resolution detection (column 11, lines 4-6) and a timer initialized by the encoder timing signal (figure 13C, column 12, lines 12-15) measures a time with a clock signal to establish the high resolution detection (figure 13A, column 12, lines 16-56).

Ikeda discloses, regarding claim 11, a method for use in an image forming device with a linear scale provided on a carriage movement path, for detecting a deviation

between a print position actually printed on a print paper by a head and a print target position, said method comprising the steps of:

providing a timer for detecting a position within a unit interval determined by a resolution of said linear scale (column 8, lines 7-33);

printing a predetermined print element at the target position on the print paper by the heads mounted on the carriage (102) that scans in a main scan direction (column 2, lines 59-61);

detecting said print element with a sensor (11) mounted on the carriage (102) (column 2, lines 62-65, column 4, lines 64-65);

detecting a low resolution position based on the linear encoder scale when the print element is detected and detecting a high resolution position within the unit interval with said timer (column 8, lines 7-33); and

obtaining the deviation between a position detected by combining the low resolution and high resolution detection and the print target position (column 8, lines 28-33).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-5, 7, 8 and 10-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cobbs et al. US 5,600,350 in view of Goetz et al. US 5,170,416.

Cobbs et al. discloses, regarding claim 1, an image forming device that forms an image on a print paper (30) in an ink jet recording method with a plurality of heads (102, 104, 106, 108), comprising:

main scanning direction moving means (figure 2, column 4, lines 23-31) for moving a carriage (100) in a main scanning direction, said carriage (100) having said plurality of heads (102, 104, 106, 108) mounted thereon;

paper conveying means (figure 3, column 4, lines 46-58) for conveying the print paper (30) in a sub-scanning direction;

pattern printing means (107) for printing, with at least one head, a test pattern including predetermined pattern elements (figure 5, column 5, lines 29-35);

pattern detecting means (200), mounted on said carriage (100), for detecting the pattern elements of the test pattern printed on the print paper by said printing means (107) (column 5, lines 7-15);

binary conversion means (304, figure 10) for binarizing an output of said pattern detection means (200);

position detection means (an optical reader) for detecting a position of the carriage in said main scanning direction (column 4, lines 32-45);

calculating means (306, 314) for moving said carriage (100) to detect the pattern elements of the test pattern with said pattern detecting means (200), for detecting a print position of the pattern elements based on a detection result of said position

detection means when a rising/falling edge of a binary signal obtained by said binary conversion means (304) is generated, and for calculating a mounting deviation error of each head in said main scanning direction (figure 10, column 7, lines 30-46),

wherein said position detection means is based on a linear scale (120) provided on a movement path of said carriage (100).

Regarding claim 2, the test pattern includes vertical bars (404) extending in the sub-scanning direction substantially perpendicular to said main scan direction (figure 5).

Regarding claim 3, the test pattern includes horizontal bars (408, figure 5) extending substantially in parallel with said main scan direction and the image forming device further comprises:

conveyance amount detecting means (160, figure 3) for detecting a conveyance amount of the print paper in the sub-scan direction substantially perpendicular to the main scan direction (column 4, lines 46-58); and

measuring means (308) for measuring the conveyance amount equal to or smaller than a minimum unit determined by a resolution of said conveyance amount detecting means (160) (column 7, lines 43-46),

wherein said calculating means (306, 314, figure 10) moves the paper on which the test pattern is printed, with the use of said paper conveying means with respect to the carriage to detect the pattern elements of the test pattern with said pattern detecting means, detects the print position of the pattern elements based on the detection results of said conveyance amount detecting means (160) and said measuring means (308) when a rising/falling edge of the binary signal obtained by said binary conversion means

(304) is generated, and calculates an amount of mounting deviation of each head in a sub-scanning direction based on the print position of the pattern elements printed by each head (figure 10, column 7, lines 30-46).

Regarding claims 4, 13 and 14, the pattern detecting means (200) includes light emitting elements (232, 234) and a light receiving element (240) (column 6, lines 19-27).

Regarding claims 7 and 10, a print position is based on an average value of the width of the detected vertical bar (figure 17, column 8, lines 61-64).

Cobbs et al. discloses, regarding claim 11, a method for use on an image forming device with a linear scale (120) provided on a carriage movement path, for detecting a deviation between a print position actually printed on a print paper by a head and a print target position said method comprising:

printing a predetermined print element (figure 5) at the target position on the print paper by the head mounted on a carriage (100) that scans in a major scanning direction (column 6, lines 51-67);

detecting said print element with a sensor (200) mounted on the carriage (100) (column 5, lines 36-45); and

detecting a position based on said linear scale (120) when the print element is detected and obtaining the deviation between the detected position and the print target position (column 2, lines 48-57).

Cobbs et al. fails to disclose, regarding claim 1, that the position detection means includes high resolution position detection means for detecting a position more finely

than a minimum unit determined by the resolution of the low resolution linear scale (120) and a combination of the high and low resolution detecting means are utilized to detect the position of the pattern elements.

Cobbs et al. fails to disclose, regarding claim 5, that the low resolution position detection comprises a counter for counting a timing signal based on said linear scale (120) wherein said high resolution detection means comprises a timer which is initialized by said timing signal and measures a time with a predetermined clock signal.

Cobbs et al. fails to disclose, regarding claim 8, means for measuring a unit time interval of said linear scale at a time said pattern elements are detected and means for correcting a measured value of said timer based on the measured value and a theoretical value of said unit time interval.

Cobb et al. fails to disclose, regarding claim 11, providing a timer for detecting a position within a unit interval determined by a resolution of said linear scale (120) and detecting a high resolution position within the unit interval with the timer.

Cobb et al. fails to disclose, regarding claim 12, correcting the high resolution position within the unit interval based on an actual measurement value measured in a minimum interval of said linear scale and a theoretical value thereof.

Goetz et al. discloses, regarding claim 1, position detection means for detecting the position of a print carriage in a main scan direction which includes high resolution position detection means (the circuitry producing the CKOUT signal as shown in figures 4A and 4B) for detecting a position more finely than a minimum unit determined by the resolution of low resolution position detection means (86, 88) (column 3, lines 15-25) in

order to achieve higher resolution print position detection without utilizing an increased cost high resolution encoder (column 2, line 60 - column 3, line 4).

Goetz et al. discloses, regarding claim 5, that the low resolution position detection comprises counters (86, 88) for counting a timing signal (CLK signal) based on a linear scale (20) (column 4, lines 43-55) wherein said high resolution detection means comprises a timer (CLKOUT signal) which is initialized by said timing signal and measures a time with a predetermined clock signal (column 4, line 56 - column 5, line 29).

Goetz et al. discloses, regarding claim 8, means for measuring a unit time interval of said linear scale (this corresponds to the means for generating the SIN signal in figure 5) and means for correcting a measured value of said timer (this corresponds to the means for generating the QPRN signal of figure 5) based on the measured value (SIN) and a theoretical value (INPUT A) of said unit time interval (column 6, lines 44-63).

Goetz et al. discloses, regarding claim 11, providing a timer (the circuitry that produces CKOUT signal as shown in figures 4A and 4B) for detecting a position within a unit interval determined by a resolution of a linear scale (20) and detecting a high resolution position within the unit interval with the timer (column 3, lines 15-25).

Goetz et al. discloses, regarding claim 12, correcting the high resolution position within the unit interval based on an actual measurement value measured in a minimum interval of said linear scale and a theoretical value thereof (column 6, lines 44-63, figure 5).

It would have been obvious to a person of ordinary skill in the art at the time of the invention to provide the means and steps of Goetz et al. to establish a higher resolution and corrected timing signal from the encoder of Cobbs et al. to establish higher resolution print head position determination.

The motivation for doing so would have been to correct for errors in the codestrip detection and to more precisely determine the position of print heads as taught by column 2, line 42 - column 3, line 8 of Goetz et al.

Additional Prior Art

4. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Murakami US 6,082,911 discloses printing vertical bars making up a test pattern in different passes of a print head wherein the different portions are printed by different portions of a single head as described in relation to the embodiment of figures 6A and 6B or by different color print head portions during different scans as described in relation to the embodiment of figure 12 to correct for print deviation during bi-directional printing.

Allowable Subject Matter

5. Claims 9 and 17 are allowed.

Claim 6 and 16 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

The primary reason for the indication of the allowability of claims 6, 9, 16 and 17 is the inclusion therein, in combination as currently claimed, of the limitation of the test pattern printing means wherein, **for each head**, said test pattern includes as a pattern element at least one vertical bar extending in the sub-scanning direction substantially perpendicular to the main scanning direction and wherein said pattern printing means divides said vertical bar into **a plurality of portions** and causes each of **different portions of a single head** to print a plurality of dots sequentially in **a plurality of passes**, said plurality of dots constituting a portion of said vertical bar. This limitation is found in claims 6, 9, 16 and 17 and is neither disclosed nor taught by the prior art of record, alone or in combination.

The examiner recognizes that the allowable subject matter provides advantages to the art including, but not limited by, a reduction in a read error when reading the vertical bar test pattern as explained by applicant in relation to the exemplary embodiment of figures 20a, 20b, 21.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably

accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Response to Arguments

6. Applicant's arguments filed January 30, 2003 have been fully considered but they are not fully persuasive.

Applicant's have argued regarding Goetz et al. '416 as utilized in the applied rejection that Goetz et al. corrects the duty cycle of encoders but fails to provide a high resolution position detection.

The examiner strongly disagrees with this assessment of Goetz et al. '416. A review of column 2, line 60 - column 3, line 4 and the abstract of Goetz et al. should make it clear that the synthetic encoder pulse is intended as a higher resolution position detection means than the encoder scale for determining the position of a print head with greater precision. Combined with the teachings of Cobbs et al. which utilizes an encoder scale as a reference for determining the print position of vertical test lines it would have been obvious for a person of ordinary skill in the art at the time of the invention to utilize the high resolution synthetic encoder pulse as the reference since the motivation of greater precision detection is taught by Cobbs et al.

In addition the examiner has discovered new prior art (Ikeda '588) which has been provided in a new rejection which fully anticipates claims 1-5, 7, 8 and 10-15.

The examiner has found the arguments of the applicant regarding claims 6, 9, 16 and 17 to be convincing. While it is noted by the examiner that different print head

portions have been utilized in different passes to establish vertical test print patterns as evidenced for example by Murakami (see for example figures 6A and 6B). The feature of the test pattern printing means wherein, **for each head**, said test pattern includes as a pattern element at least one vertical bar extending in the sub-scanning direction substantially perpendicular to the main scanning direction and wherein said pattern printing means divides said vertical bar into **a plurality of portions** and causes each of **different portions of a single head** to print a plurality of dots sequentially in **a plurality of passes**, said plurality of dots constituting a portion of said vertical bar has not been disclosed or rendered obvious by the art of record.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Blaise Mouttet whose telephone number is (703) 305-3007. The examiner can normally be reached on Monday-Friday from 8:30 a.m. to 5:00 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John E. Barlow, Jr. Art Unit 2853, can be reached on (703) 308-3126. The fax phone number for the organization where this application or proceeding is assigned is (703) 305-3432.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Blaise Mouttet February 25, 2003

Bm 2/25/2003



LAMSON NGUYEN
PRIMARY EXAMINER